

543,151

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
12 August 2004 (12.08.2004)

PCT

(10) International Publication Number
WO 2004/068529 A2

(51) International Patent Classification⁷: **H01J 37/244**,
G01N 23/203, H01L 21/66

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(21) International Application Number:
PCT/JP2004/000711

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(22) International Filing Date: 27 January 2004 (27.01.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2003-016987 27 January 2003 (27.01.2003) JP
2003-020126 29 January 2003 (29.01.2003) JP

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— without international search report and to be republished upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: MAPPING-PROJECTION-TYPE ELECTRON BEAM APPARATUS FOR INSPECTING SAMPLE BY USING ELECTRONS EMITTED FROM THE SAMPLE

(57) Abstract: An apparatus capable of detecting defects of a pattern on a sample with high accuracy and reliability and at a high throughput, and a semiconductor manufacturing method using the same are provided. The electron beam apparatus is a mapping-projection-type electron beam apparatus for observing or evaluating a surface of the sample by irradiating the sample with a primary electron beam and forming on a detector an image of reflected electrons emitted from the sample. An electron impact-type detector such as an electron impact-type CCD or an electron impact-type TDI is used as the detector for detecting the reflected electrons. The reflected electrons are selectively detected from an energy difference between the reflected electrons and secondary electrons emitted from the sample. To eliminate charge-up caused on the sample surface by irradiation with the primary electron beam, the surface of the sample is covered with a cover placed above the sample and a gas is supplied to the space above the sample covered with the cover. The gas is brought into contact with the sample surface to reduce charge-up on the sample surface.

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